

AUTOMATIC DIMENSION ANALYZER (ADA)

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Abstract:

The main aim of the project is to measure the dimensions of object in the fully automated way and it can be implemented in the industrial applications mainly in the manufacturing industries, when the object was manufactured it was inspected automatically and can also decide automatically whether the manufactured product is accepted or rejected and also either it may be re machined again. Mainly it was used in the QC department of manufacturing industries.

Keywords — Dimensions, Photo diode, Stepper motor, IR led.

I. INTRODUCTION

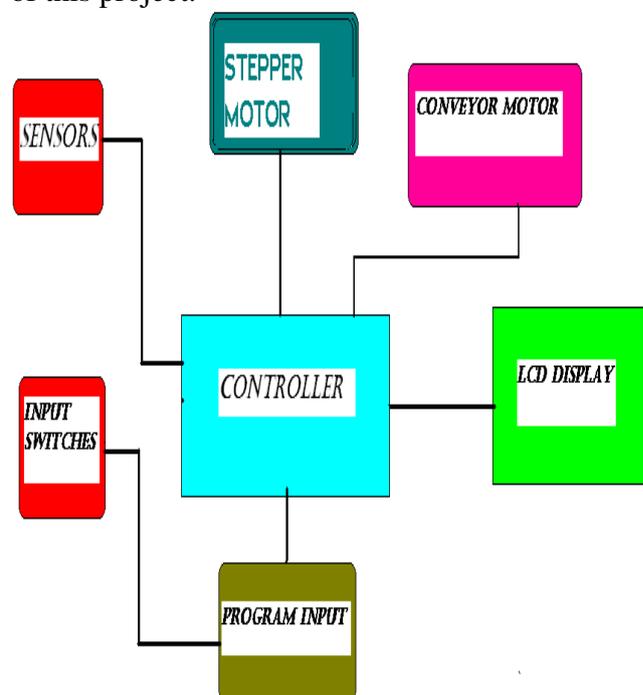
Automatic dimension analyser is a machine it can measure the dimensions of the components. As we all know Measurements play a vital role in manufacturing field to maintain the quality of the product. Generally we are using measuring instruments like vernier callipers, micro meters, etc to measure the dimensions of various components at required level of accuracy. But Dimension analyser has a capability to measure & display the dimensions of basic shapes like **CUBES, RECTANGLE BLOCKS and CYLINDERS**.

ADA can measure the following features:

- LENGTH
- WIDTH
- THICKNESS
- DIAMETER
- HEIGHT
- DEPTH

II. BLOCK DIAGRAM

The block diagram of automatic dimension analyser will clearly show the main system used in this project. The microcontroller will be the main part of this project.



III. PHYSICAL STRUCTURE

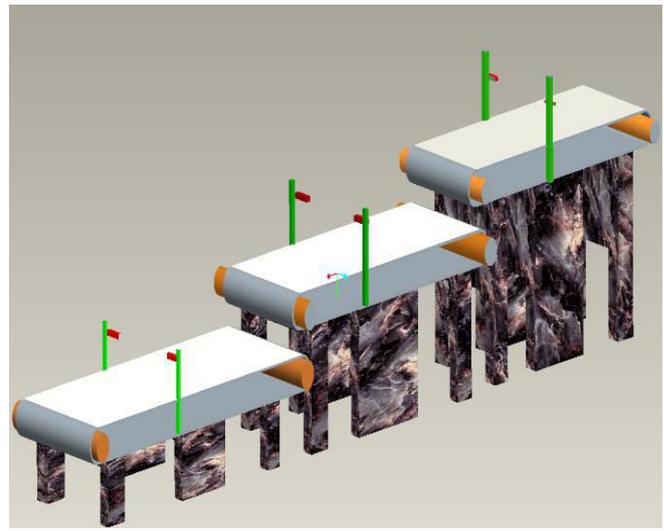
The roller of the conveyor was engaged with the gear to the stepper motor and it will help to move the conveyor. The **IR LED** and the **PHOTO DIODE** was situated in the conveyors either side. There was a mechanical arrangement to push the components to the respected bin. These mechanical arrangements were geared with the stepper motor. This stepper motor was connected to the driver IC of the stepper motor and the IC was connected to the microcontroller.

The motor works under the control of the microcontroller. The sensor was connected at the starting of the conveyor, when the component reaches the conveyor, it was sensed by the sensor and it send signal to the microcontroller through the ADC and the controller send the signal to the conveyor stepper motor and starts the conveyor. Two bins were arranged at the end of the conveyor to collect the respective dimension components.

If the component is accepted then it was carried to the next stage conveyor and the position of the conveyor was changed using the some mechanical techniques, now it can able to measure the next dimensions such as width of the component was able to measured. Then it was carried to the next stage if the component was accepted again its position was changed using some mechanical techniques. In the third stage other dimensions of the component was measured such as height etc.

Totally there are three stages which can able to perform the analyzing of the dimensions of the component, now the length, width and height of the component.

NOTE: *The changing of the position of component done by using the stepper motor and the sliding guide ways. The component was transferred precisely using those guide ways and the motor*



THREE STAGES OF CONVEYOR SKETCH

This sketch shows the three various stages of the conveyor which will able to carry the component to be measured and the component was transferred to the next conveyor using the some mechanical techniques and the guide ways, these three stages can perform the measurements such as length in the first stage, width in the second stage and the thickness or height in the third stage of the conveyor.

IV. PRINCIPLE OF WORKING

The ADA consists of the stages conveyor, the component is traveling in the conveyor and when it reaches the IR LED tip which is emitting the rays. It will disturb the rays between the emitter and collector that are between IR LED and the photo diode and at the time of interrupting the clock inside the microcontroller starts counting the time period that the IR beam rays have interrupted. At final when the component crosses the IR LED and passed away again the clock inside the microcontroller stops. Now we got a time period. The speed of the conveyor set by our own, by knowing the speed, time we can able to calculate the distance using the below formula. Now the length of the component is founded. Then, by changing the various position of the component we can able to measure the length, thickness, width of the component.

DISTANCE=SPEED X TIME

SPEED = Speed of the servo motor (rpm)

TIME= Interruption period of the laser beam

DISTANCE is the measurement of the component (length, width, thickness, and diameter)

The microcontroller senses and calculates the reading and displays using LCD display.

Thus the dimensions are observed.

This automatic dimension analyzer able to perform the measuring of dimension without any human help. This dimension analyzer project also has the provision of accepting and rejecting of a component that is coming after the machining process. These components are checked and decided whether it is to be accepted or rejected by measuring the dimension of the component. It is done by the comparing of measured values and the pre-defined values in the microcontroller.

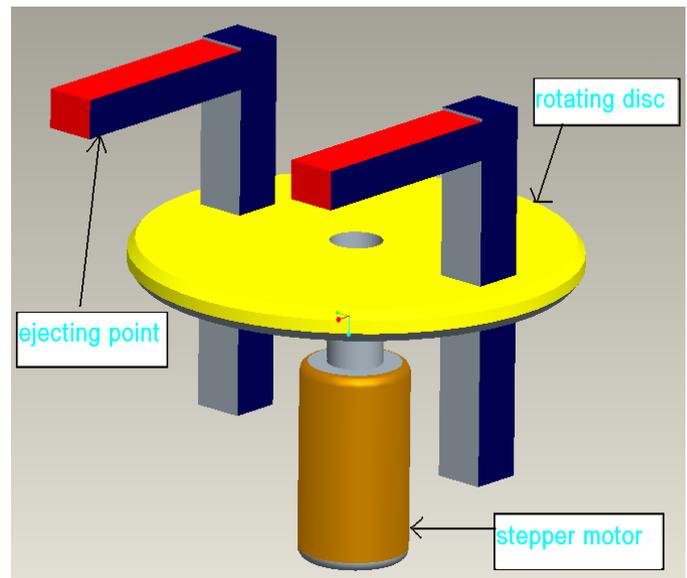
If the component is below the required dimension it is then ejected into a scrap bin. And if the component is having the extra dimension it is then ejected to the re machining work bin. If it is having the correct dimension then it is to be send to the next stage of the work through the conveyor.

The ejection to the respected bin is done using the stepper motor and a mechanical unit.

And the various type of measurement such as length, height, diameter etc can be done by changing the positions of the component. It is also possible that According to the requirement we can able to change the positioning of the IR LED and the PHOTO DIODE.

This ADA machine was very helpful in the vast manufacturing industries, mainly machining works etc.

NOTE:the changing of the positions of the component may be done automatically using some mechanical techniques

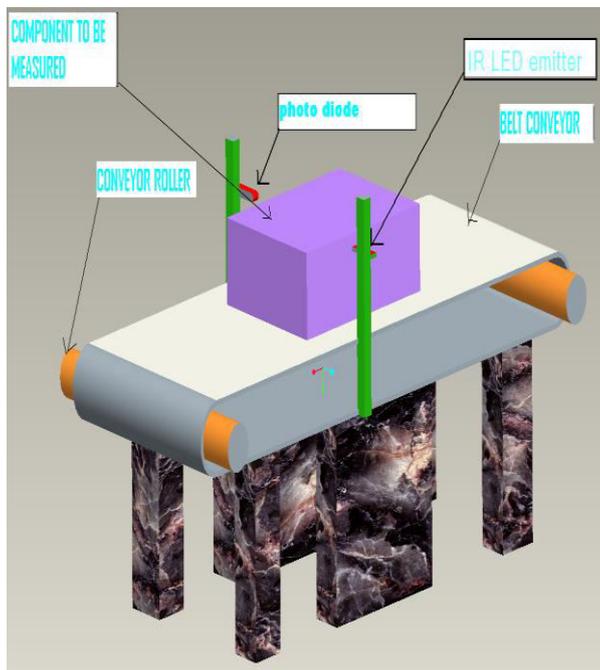
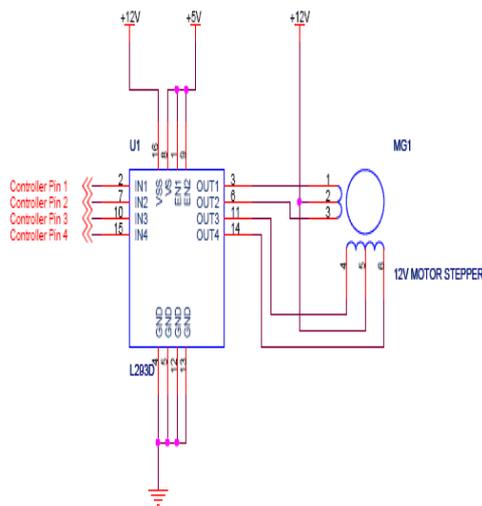


Rejecting Mechanism For The Rejected (Not Reached Required Dimension) Component

The above sketch shows the rejecting mechanism which will reject the component from the conveyor which is not reached the required dimension to the respected bin.

This mechanism has the stepper motor connected to a rotating disc in the disc there are two projecting bars it is having the ejecting mechanism of the components in the conveyor the stepper motor only rotates to the semi rotary movement because during the semi rotary movement the ejecting bar moves forward into the conveyor and will reject the component the signal to the stepper motor was given by the microcontroller. The microcontroller sends the signal only after comparing the measured values and the pre-defined values.

It was arranged in the three conveyors, if the component is selected in the first stage of the conveyor that is length then it was send to the next stage of the conveyor, in case in the first stage while measuring the length of the component if it is not reached the required level it was rejected.



Circuit Diagram For Stepper Motor Interface

Single Stage Of The Conveyor Stage -1

The above sketch shows the first stage of the conveyor which carries the component and measuring the length of the component using the PHOTO DIODE and the IR LED.

V. RESULT AND CONCLUSION

The main aim of the project is to measure the dimension of the component automatically without any human interface and also having the intelligence to decide whether the component is accepted or rejected to the next stage.

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